

CLAIMS

1. A method for rendering, on a volumetric display having a plurality of voxels, a rasterized line that approximates a desired line, said method comprising:
 - 5 positioning a screen at a first angular position in which said screen is coplanar with an entry plane;
 - selecting a first voxel corresponding to an intersection of said desired line with said entry plane;
 - 10 selecting a second voxel corresponding to a projection onto said entry plane of an intersection of said desired line with an exit plane intersecting said entry plane;
 - defining a connecting segment that connects said first voxel and said second voxel; and
 - rendering selected voxels on said screen to rasterize said connecting segment.
- 15 2. The method of claim 1, wherein rendering said selected voxels comprises uniformly illuminating said selected voxels.
3. The method of claim 1, wherein rendering said selected voxels comprises rendering said selected voxels according to a selected illumination pattern.
4. The method of claim 3, further comprising selecting said illumination pattern to assign an illumination level of at least one of said selected voxels to be substantially zero.
- 20 5. The method of claim 4 further comprising selecting said at least one of said selected voxels from a group consisting of said first voxel and said second voxel.
6. The method of claim 1, further comprising continuing to render said selected voxels while rotating said screen

from a first angular position in which said screen is coplanar with said entry plane

to a second angular position in which said screen is coplanar with said exit plane.

5 7. The method of claim 1, wherein selecting said first voxel comprises:

obtaining constants that define said line in Cartesian coordinates;

obtaining an angle descriptive of said angular position of said entry plane; and

on the basis of said constants and said angle, performing a trigonometric transformation to determine cylindrical coordinates of said intersection of said desired line with said entry plane.

10 8. The method of claim 7, wherein performing said trigonometric transformation comprises obtaining a value of a trigonometric function of an argument from a look-up table.

15 9. The method of claim 7, further comprising generating rotated coordinates corresponding to said first voxel, said rotated coordinates corresponding to rotation about a selected angle.

10. The method of claim 9, further comprising projecting said rotated coordinates to correct for keystoneing.

20 11. The method of claim 7, further comprising generating projected coordinates corresponding to said first voxel, said projected coordinates being obtained by correction for keystone distortion.

12. The method of claim 8, wherein said look-up table has a number of entries that is at least double the number of angular positions at which said screen can be positioned.

25 13. The method of claim 1, wherein rendering said selected voxels on said screen comprises applying a Bresenham algorithm to obtain said selected voxels on the

basis of said intersection of said desired line with said entry plane and said projection onto said entry plane of an intersection of said desired line with an exit plane.

14. The method of claim 1, further comprising:

5 providing a first processor dedicated to carrying out said rendering of selected voxels on said screen to rasterize said connecting segment; and

providing a second processor in communication with said first processor to provide said first processor with information indicative of said desired line.

10 15. A method of rendering a desired line in a volumetric display having a rotatable screen, said method comprising:

stepping said rotatable screen through a sequence of angular positions; and

15 at each angular position, rendering, on said rotatable screen, a rasterized approximation of a line segment containing an intersection of said desired line and said rotatable screen.

16. A computer-readable medium having encoded thereon software for rendering, on a volumetric display having a plurality of voxels, a rasterized line that approximates a desired line, said software comprising instructions for:

20 positioning a screen at a first angular position in which said screen is coplanar with an entry plane;

selecting a first voxel corresponding to an intersection of said desired line with said entry plane;

selecting a second voxel corresponding to a projection onto said entry plane of an intersection of said desired line with an exit plane intersecting said entry plane;

defining a connecting segment that connects said first voxel and said second voxel; and

rendering selected voxels on said screen to rasterize said connecting segment.

5 17. The computer-readable medium of claim 16, wherein said instructions for rendering said selected voxels comprise instructions for uniformly illuminating said selected voxels.

10 18. The computer-readable medium of claim 16, wherein said instructions for rendering said selected voxels comprise instructions for rendering said selected voxels according to a selected illumination pattern.

15 19. The computer-readable medium of claim 18, wherein said instructions for selecting said illumination pattern comprise instructions for assigning an illumination level of at least one of said selected voxels to be substantially zero.

20 20. The computer-readable medium of claim 19 wherein said instructions for selecting said illumination pattern comprise instructions for selecting said at least one of said selected voxels from a group consisting of said first voxel, and said second voxel.

25 21. The computer-readable medium of claim 16, wherein said software further comprises instructions for rendering said selected voxels while rotating said screen from a first angular position in which said screen is coplanar with said entry plane

to a second angular position in which said screen is coplanar with said exit plane.

22. The computer-readable medium of claim 16, wherein said instructions for selecting said first voxel comprise instructions for:

25 obtaining constants that define said line in Cartesian coordinates;

obtaining an angle descriptive of said angular position of said entry plane; and

on the basis of said constants and said angle, performing a trigonometric transformation to determine cylindrical coordinates of said intersection of said desired line with said entry plane.

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23. The computer-readable medium of claim 22, wherein said instructions for performing said trigonometric transformation comprise instructions for obtaining a value of a trigonometric function of an argument from a look-up table.

10 24. The computer-readable medium of claim 22, wherein said software further comprises instructions for generating rotated coordinates corresponding to said first voxel, said rotated coordinates corresponding to rotation about a selected angle.

25. The computer-readable medium of claim 24, wherein said software further comprises instructions for projecting said rotated coordinates to correct for keystoneing.

15 26. The computer-readable medium of claim 22, wherein said software further comprises instructions for generating projected coordinates corresponding to said first voxel, said projected coordinates being obtained by correction for keystone distortion.

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20 28. The computer-readable medium of claim 16, wherein said instructions for rendering said selected voxels on said screen comprise instructions for applying a Bresenham algorithm to obtain said selected voxels on the basis of said intersection of said desired line with said entry plane and said projection onto said entry plane of an intersection of said desired line with an exit plane.

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25 29. The computer-readable medium of claim 16, wherein said software further comprises instructions for:

providing a first processor dedicated to carrying out said rendering of selected voxels on said screen to rasterize said connecting segment; and

providing a second processor in communication with said first processor to provide said first processor with information indicative of said desired line.

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30 A computer-readable medium having encoded thereon software for rendering a
5 desired line in a volumetric display having a rotatable screen, said software
comprising instructions for:

stepping said rotatable screen through a sequence of angular positions; and

at each angular position, rendering, on said rotatable screen, a rasterized approximation of a line segment containing an intersection of said desired line and said rotatable screen.

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the day after the 2nd in 1871 in
the same place.